



# MASTER OF SCIENCE (STATISTICS) PROGRAM

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**UP SCHOOL OF STATISTICS  
GRADUATE PROGRAMS**

UNIVERSITY OF THE PHILIPPINES  
SCHOOL OF  
STATISTICS

# ABOUT THE PROGRAM

The program prepares its graduates for advanced level capability in the profession as well as provides them the necessary foundation for high quality PhD work both in the theoretical and practical aspects.

FIRST YEAR				SECOND YEAR			
1 <sup>ST</sup> SEMESTER		2 <sup>ND</sup> SEMESTER		1 <sup>ST</sup> SEMESTER		2 <sup>ND</sup> SEMESTER	
Stat 230	3	Stat 232	3	Stat 233	3	Stat 290	1
Stat 231	3	Stat 250	3	Stat 290	1	Stat 300	6
Elective	3	Elective	3	Elective	3	Stat 234	3
		<i>Students are encouraged to start working on their Thesis at this point.</i>		Elective	3		
<b>TOTAL</b>	<b>9</b>	<b>TOTAL</b>	<b>9</b>	<b>TOTAL</b>	<b>10</b>	<b>TOTAL</b>	<b>10</b>

# ***CORE COURSES***

## **Stat 231: Probability Theory**

Probability spaces and random variables; probability distributions and distribution functions; mathematical expectation; convergence of sequences of random variables; laws of large numbers; characteristic functions.

## **Stat 232: Parametric Inference**

Exponential family of densities; point estimation: sufficiency, completeness, unbiasedness, equivariance; hypothesis testing

## **Stat 233: Linear Models**

Subspaces and projections; multivariate normal distribution, non-central distributions, distribution of quadratic forms; the general linear model of full column rank, tests about the mean; tests about the variance; the general linear model not of full column rank; estimability and testability.

## **Stat 234: Multivariate Analysis**

Distribution theory for multivariate analysis; the multivariate one-and-two sample models; the multivariate linear model.

## **Stat 250: Sampling Designs**

Concepts in designing sample surveys; non-sampling errors; simple random sampling; systematic sampling; sampling with varying probabilities; stratification, use of auxiliary information; cluster sampling; multi-stage sampling.



# ***OTHER COURSES & ELECTIVES***

## **Stat 230: Special Topics in Mathematics for Statistics**

Special topics in mathematics and their applications in statistics. To be arranged according to the needs of students

## **Stat 290: Statistical Consulting**

Application of statistical concepts and methodologies to data of researchers seeking statistical consultancy services.

## **Stat 300: Thesis**

In the Thesis, the student should be able to demonstrate capability in conducting basic research in statistics. The work should contribute in the body of knowledge in the statistical science. Such new knowledge generated from the thesis can be derived analytically or computationally (simulations)

## **Electives based on Area of Concentration**

- Industrial Statistics
- Mathematical Statistics
- Computational Statistics
- Market Research and Business Intelligence
- Social Statistics
- Risk Management and Stochastic Finance

# ***ELECTIVE COURSES***

## **Stat 210: Statistical Software**

Database management and programming using statistical software

## **Stat 224: Experimental Designs**

Completely randomized designs; randomized complete block design; Latin square design; factorial experiments; incomplete block design; higher-order designs.

## **Stat 225: Time Series Analysis**

Classical procedures; stationarity; Box-Jenkins modeling procedure: autocorrelation function, partial autocorrelation function, identification, estimation, diagnostic checking, forecasting; transfer functions; applications.

## **Stat 226: Applied Multivariate Analysis**

Multivariate normal distribution; principal components analysis; biplots and h-plots; factor analysis; discriminant analysis; cluster analysis; multidimensional scaling; correspondence analysis; canonical correlation analysis; graphical and data oriented techniques; applications.

## **Stat 235: Survey of Stochastic Processes**

Markov chains; Markov processes; Poisson processes; renewal processes; martingales.

# ***ELECTIVE COURSES***

## **Stat 240: High Dimensional Data**

High dimensional data; high dimensional data visualization; high dimensional data analysis; dimension reduction; pattern search; clustering; applications.

## **Stat 242: Econometric Methods**

Distributed lag models; structural change; simultaneous equations; limited dependent variables; ARCH, GARCH processes; cointegration; applications.

## **Stat 243: Categorical Data Analysis**

Cross-classified tables, multidimensional tables; loglinear model; logit models, measures of association; inference for categorical data; applications.

## **Stat 245: Survival Analysis**

Functions of survival time; estimation of survival functions; survival distributions and their applications; distribution fitting and goodness-of-fit tests.

## **Stat 246: Response Surface Methods**

Product design and development; optimal designs; response surface models; response surface optimization; applications.



# ***ELECTIVE COURSES***

## **Stat 247: Data Mining and Business Intelligence**

Principles of data mining; methods of data mining; themes of data mining; applications of data mining in business intelligence.

## **Stat 249: Nonparametric Modeling**

Smoothing methods; kernel smoothing; spline smoothing; regression trees; projection pursuit; nonparametric regression; cross-validation; scoring; high dimensional predictors; additive models; backfitting

## **Stat 260: Quantitative Risk Management**

Market risk; financial time series; copulas; extreme value theory; credit risk models; operational risks.

## **Stat 261: Stochastic Calculus for Finance**

Continuous-time model; Brownian motion; random walk; quadratic variation; Ito formula; Black-Scholes equation; risk-neutral measure; martingale representation theorem; fundamental theorems of asset pricing.

## **Stat 263: Bayesian Analysis**

Bayesian inference; empirical and hierarchical analysis; robustness; numerical procedures.

# ***ELECTIVE COURSES***

## **Stat 266: Applied Nonparametric Methods**

Methods for single, two and k samples; trends and association; nonparametric bootstrap.

## **Stat 267: Advanced Applied Multivariate Analysis**

Confirmatory factor analysis; multidimensional scaling; correspondence analysis; classification trees; CHAID; procrustes analysis; neural networks; structural equation modeling

## **Stat 268: Advanced Time Series Analysis**

Nonstationarity; cointegration; interventions models; state space models; transfer functions; frequency domain; panel data; nonparametric methods for time series; nonparametric prediction; AR-Sieve; block bootstrap.

## **Stat 271: Statistical Quality Control**

Overview of the statistical methods useful in quality assurance; statistical process control; control charts for variables and attributes, cusum chart, multivariate chart; process capability analysis; acceptance sampling; MIL STD tables and JIS tables; off-line quality control; introduction to response surface analysis; Taguchi method; applications.



# ***ELECTIVE COURSES***

## **Stat 274: Market Research**

The marketing research; data and data generation in marketing research; analytical methods; consumer behavior modeling

## **Stat 275: Economic Statistics**

The Philippine Statistical System; surveys being regularly conducted by the system: questionnaire designs, sampling designs, estimators, issues; official statistics being generated: national accounts, consumer price index, input-output table, poverty statistics, leading economic indicators, seasonally adjusted series; statistical methods useful in generating official statistics

## **Stat 276: Statistics for Geographic Information Systems**

Components of a geographical information system, data structures and elements of spatial modeling; exploratory spatial data analysis; quadrat analysis, tessellations and spatial autocorrelation; spatial modeling and prediction; some sampling theory; applications.

## **Stat 277: Statistics for Image Analysis**

Radiometric enhancement techniques; geometric enhancement using image domain techniques; multispectral transformation of data; supervised classification techniques; clustering and unsupervised classification; applications.